REMARKS

Reconsideration of the application as amended is respectfully requested.

Status of Claims

Claims 1-3 and 5-7 are pending in the application, with claim 1 and 6 being the only independent claims. Claim 1 has been amended to include the subject matter of claim 4. Claim 4 has been canceled, without prejudice.

Overview of the Office Action

Claims 1, 2 and 5-7 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 6,686,985 (*Tanaka*) in view of U.S. Patent No. 4,937,129 (*Yamazaki*).

Claim 3 stands rejected under 35 U.S.C. §103(a) as unpatentable over *Tanaka* in view of *Yamazaki* and further in view of U.S. Patent No. 5,157,470 (*Matsuzaki*).

Summary of Subject Matter Disclosed in the Specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

The specification discloses a semi-transmitting mirror-possessing substrate assembly (1) that has both high transmissivity and high reflectivity. A semi-transmitting type liquid crystal display apparatus containing such a substrate assembly is also disclosed. *See* paragraph [0001] of the published specification.

The semi-transmitting mirror-possessing substrate assembly (1) includes:

a glass substrate (2);

a foundation film (3) formed directly on the glass substrate (2); and

a semi-transmitting reflective film (4) formed on the foundation film (3) and made of at least one selected from the group consisting of Al and Al alloys.

The foundation film (3), which is made of silicon oxide (SiO_x), the semi-transmitting reflective film (4) and a protective film (5) constitute a semi-transmitting mirror (6). *See* Fig. 1; paragraphs [0025] and [0027] of the published specification.

The thickness of the foundation film (3) is in a range of greater than 0 to 8 nm. This particular thickness range of the foundation film (3) improves the crystal structure of the Al metal/alloys in the semi-transmitting reflective film (4) formed on the foundation film (3) so that an increase in the amount of optical absorption of the Al metal/alloys is prevented. As a result, both the optical transmission performance and the reflection performance of the semi-transmitting reflective film (4) and/or the semi-transmitting mirror (6) are improved. *See* paragraph [0028] of the published specification.

It has been found that in the case that the transmissivity is unchanged, if the thickness of the foundation film (3) exceeds 8 nm, the reflectivity suddenly drops. *See* paragraph [0041] of the published specification.

Furthermore, the chemical composition ratio x of oxygen (O) to silicon (Si) in the silicon oxide (SiO_x) used as the foundation film (3) is in a range of 1.5 to 2.0. This particular chemical composition ratio also improves the crystal structure of the Al metal/alloys in the semi-transmitting reflective film (4) formed on the foundation film (3) so that an increase in the amount of optical absorption of the Al metal/alloys is prevented. As a result, both the optical transmission performance and the reflection performance of the semi-transmitting reflective film

(4) and/or the semi-transmitting mirror (6) are improved. *See* paragraph [0029] of the published specification.

It has been found that in the case that the transmissivity is unchanged, if the chemical composition ratio x of oxygen (O) to silicon (Si) in the silicon oxide (SiO_x) used as the foundation film (3) is <u>less than 1.5</u>, <u>the reflectivity suddenly drops</u>. *See* paragraph [0047] of the published specification.

<u>Descriptive Summary of the Prior Art</u>

<u>Tanaka</u>

Tanaka discloses a liquid crystal panel (100), which includes a device substrate (200) which is made of an insulating material such as quartz or glass; an insulator film (201) formed on the device substrate (200); and a pixel electrode (234) which is on the insulator film (201) and formed by a reflective metal film having a high reflectivity. *See* Fig. 4; col. 7, lines 20-21, lines 24-29, lines 9-11. A first metal film (222) is also formed on the insulator film (201). *See* col. 6, lines 45-51; Fig. 4. The pixel electrode (234) does not overlap with the first metal film (222). *See* Fig. 4.

The insulator film (201) is used <u>to prevent the first metal film (222) from being removed from the device substrate</u> (200) by heat treatment and <u>to prevent impurities from diffusing in the first metal film</u> (222). If such removal or impurity problems will not occur, the insulator film (201) can be omitted. *See* col. 7, lines 24-29.

Yamazaki

Yamazaki relates to a thin film pattern formed by laser scribing of a conductive thin film formed on a soda-lime glass substrate (1) suitable for liquid crystal devices. *See* col. 1, lines 7-10; abstract.

In particular, a first ion blocking film (2) is formed on the glass substrate (1). This first ion blocking film (2) is made of silicon oxide and has a thickness of 10 to 150 nm. A transparent conductive film (4) is formed on the first ion blocking film (2). *See* Figs. 3(A) to 3(D); col. 2, lines 24-31.

A laser beam is then repeatedly projected on the glass substrate (1) to form a plurality of grooves (6-1, 6-2, 6-3, etc.), which reach the glass substrate (1). *See* Figs. 3(B) and 3(C); col. 2, lines 55-59, 62-66.

A second ion blocking film (8) is then formed on the transparent conductive film (4) and in the grooves (6-1, 6-2, 6-3, etc.). The second ion blocking film (8) may contain silicon oxide and has a thickness of 5-250 nm. *See* Fig. 3(D); col. 3, lines 13-18, 23-26.

As indicated by their names, each of the first and second ion blocking films (2, 8) is used to block undesired contamination by sodium ions from the glass substrate (1). *See*, *e.g.*, col. 1, lines 62-64; col. 3, lines 13-15.

Matsuzaki

Matsuzaki discloses a thin film transistor, which includes an insulating substrate (1) such as a glass plate or the like; a first electrode (2) acting as a gate electrode; a gate insulating film (3); a thin film pattern (4) mainly composed of silicon and acting as a semiconductor film; and a thin film (10) containing silicon oxide. *See* col. 2, lines 58-60; col. 6, lines 26-37; Figs. 2A and

2B.

The thin film (10) may contains silicon oxide (SiO_x; $1.5 \leqq x \leqq 2.0$) and phosphorous, and preferably has a thickness of 0.5-10 nm. *See* col. 5, lines 65-67; col. 7, lines 50-54.

In *Matsuzaki*, the thin film (10) is used to prevent electrodes (5, 6), which are formed by a metal film such as an Al film and are on top of the thin film (10), from reacting with the amorphous silicon in the thin film pattern (4). *See* col. 6, lines 55-66; col. 7, lines 46-54.

Arguments

Independent Claim 1

Applicants respectfully submit that claim 1, as amended, is patentable over *Tanaka* in view of *Yamazaki* because there is no suggestion or motivation to modify *Tanaka* with *Yamazaki* in the way proposed in the Office Action.

In particular, it is noted that in *Yamazaki* the first ion blocking film (2), which is directly on the glass substrate (1), has a thickness of 10 to 150 nm to effectively prevent sodium ion contamination from the glass substrate (1). Thus, according to *Yamazaki*, the first ion blocking film (2) must have a thickness of at least 10 nm in order to effectively block sodium ion contamination.

Although *Yamazaki* mentions the second ion blocking film (8) has a thickness of 5-250 nm, the lower limit of which is intended for areas that are already covered by the first ion blocking film (2) and the transparent conductive film (4) while the higher limit is intended for the grooves (6-1, 6-2, 6-3) where the first ion blocking film (2) and the transparent conductive film (4) have been removed ("[f]or example, the thickness is 30 [nm] on the conductive film and 50 [nm] in the grooves", "the thickness of the second blocking film in the groove is greater than

that on the transparent conductive film"). *See* col. 3, lines 23-26, 32-34 of *Yamazaki.*

In particular, Yamazaki explicitly teaches that "when the second blocking film is formed to a thickness of 5-30 [nm] on the conductive film, the thickness on the bottom of the grooves becomes 10-60 [nm]. *See* col. 3, lines 34-37 of *Yamazaki.* Therefore, when the first and second ion blocking films (2, 8) are considered together, *Yamazaki* teaches or suggests that when only one ion blocking film is used to effectively block sodium ion contamination from the glass substrate (1), that ion blocking film must have a thickness of at least 10 nm.

As a result, a person with ordinary skill in the art would not be motivated to modify the thickness of the only insulator film (201) of *Tanaka* to the range of greater than 0 to 8 nm in view of the at least 10 nm thickness teaching of *Yamazaki* in an attempt to improve both the optical transmission performance and the reflection performance of the pixel electrode (234).

This is especially true when the optical reflectivity of the pixel electrode (234) would suddenly drop if the thickness of the insulator film (201) of *Tanaka* exceeds 8 nm, and when *Tanaka* actually teaches eliminating the insulator film (201) completely if the removal or impurity problem does not occur. Therefore, there is no suggestion or motivation to modify *Tanaka* with *Yamazaki* in the way proposed in the Office Action.

The fact that something can be done is an insufficient basis to obviate an invention. Absent a motivation, *Tanaka* can be combined with *Yamazaki* in the way proposed in the Office Action only with impermissible hindsight based on the present invention.

In addition, as discussed above, in the present invention, the thickness of the foundation film (3) is in a range of greater than 0 to 8 nm in order to improve the crystal structure of the Al metal/alloys in the semi-transmitting reflective film (4) formed on the foundation film (3) so that an increase in the amount of optical absorption of the Al metal/alloys is prevented. As a result,

both the optical transmission performance and the reflection performance of the semi-transmitting reflective film (4) and/or the semi-transmitting mirror (6) are improved. *See* paragraph [0028] of the published specification.

In sharp contrast, neither the insulator film (201) of *Tanaka* nor the second ion blocking film (8) of *Yamazaki* is used to improve the crystal structure of Al metal/alloys in an adjacent semi-transmitting reflective film so that both the optical transmission performance and the reflection performance of the semi-transmitting reflective film are improved.

As discussed above, the insulator film (201) of *Tanaka* is used to prevent the first metal film (222) from being removed from the device substrate (200) by heat treatment and to prevent impurities from diffusing in the first metal film (222). If such removal or impurity problems will not occur, *Tanaka* teaches that the insulator film (201) can be omitted. *See* col. 7, lines 24-29. Similarly, the second ion blocking film (8) of *Yamazaki* is used to block undesired contamination by sodium ions from the glass substrate (1). *See*, col. 1, lines 62-64.

Recognition of the problem being solved is important when considering the issue of obviousness under 35 U.S.C. §103. There is a line of CAFC cases dealing with the relevance of the problem being solved in determining obviousness. In re Dillon, 892 F.2d 1554 (Fed. Cir. 1989). In re Wright, 848 F.2d 1216 (Fed. Cir. 1988) states the following:

> "The determination of whether a novel structure is or is not 'obvious' requires cognizance of the properties of that structure and the problem which it solves, viewed in light of the teachings of the prior art." (emphasis added).

It is respectfully submitted that if this aspect of the case law is considered, one has to conclude that claim 1 is patentable over the applied references.

In view of the foregoing, withdrawal of the 35 U.S.C. §103 rejection of claim 1 is respectfully requested.

Dependent Claims 2, 3 and 5

Claims 2, 3 and 5 depend, either directly or indirectly, from claim 1 and, thus, each is allowable therewith.

In addition, claims 2, 3 and 5 include features which serve to even more clearly distinguish the claimed invention over the prior art of record.

Independent Claim 6

Independent claim 6 is patentable over *Tanaka* in view of *Yamazaki* for reasons discussed above in connection with claim 1.

In addition, the same reasons why there is no suggestion or motivation to modify *Tanaka* with *Yamazaki*, or to modify *Tanaka* with *Matsuzaki* (as discussed in detail in the Response dated December 9, 2005, the problems being solved by *Tanaka* with *Matsuzaki* are different) with respect to the foundation film thickness limitation are also applicable to the limitation that the foundation film has a chemical composition ratio x of oxygen (O) to silicon (Si) in the silicon oxide (SiO_x) in a range of 1.5 to 2.0.

In view of the foregoing, withdrawal of the §103(a) rejection of claim 6 is respectfully requested.

Dependent Claim 7

Claim 7 depends directly from claim 6 and, thus, it is allowable therewith.

Conclusion

Applicants respectfully submit that the amendments to the claims, which involve adding the subject matter of claim 4 to claim 1 and canceling claim 4, do not raise any new issues that would require further consideration and/or search by the Examiner.

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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